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XV

**ANTHIDIINE BEES IN THE COLLECTION OF THE
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BY

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1. *Anthidium angelarum* Titus

Females: Colton, May 26-28 (Van Duzee); hills back of Oakland, May 8 (Van Dyke); Santa Monica (F. C. Clark); Stone Cañon, Monterey Co., April 21 (Van Duzee); Poway, San Diego Co., June 10 (Blaisdell); all in California.

Males: Cisco, July (Mrs. H. E. Ricksecker); Meadow Valley, 3500-4000 ft., June 5 (Van Dyke); Poway, San Diego Co., May 31 (Blaisdell); South Sonoma Co., July 1 (Kusche); all in California.

2. *Anthidium nebrascense* Swenk

Swenk described this (1914) from Nebraska and Wyoming. The following year he recorded it from Truckee, Calif. The Californian specimens before me show variation, but they agree so closely with the description of *A. nebrascense* that I do not know how to separate them. They are close to *A. titusi* Kll., but the end of the abdomen is different.

Males: Panoche Cañon, Fresno Co., April 29 (Van Dyke); Colton, May 26-28 (Van Duzee); Poway, San Diego Co., May 16 (Blaisdell); hills back of Oakland, May 15 (Van

September 5, 1925

Dyke); Santa Monica (F. C. Clark); Stone Cañon, Monterey Co., April 21 (Van Duzee); all in California.

The only female which seems likely to belong to these males is the one which I have identified as *A. emarginatum atripes* Cresson, but the type (male) of *atripes* is certainly not *nebrascense*. I must leave the final decision about the supposed *atripes* to those who can study the species in the field. The black scutellum of the *nebrascense* males certainly argues against their association with the supposed *atripes*; but Swenk has what he regards as female *nebrascense* from Wyoming, and it had two linear marks on scutellum.

3. *Anthidium hesperium* Swenk

Females: Mokelumne Hill, October (Blaisdell); San Diego (Blaisdell); Millbrae, San Mateo Co., Sept. 1 (Blaisdell); Crystal Lakes, San Mateo Co., June 25 (Van Duzee); all in California. The first abdominal segment usually has an interrupted band instead of four spots, but the insect agrees otherwise with Swenk's description, based on females from Palo Alto and Pacific Grove. The male is unknown. The species seems to belong to late summer and early fall, the earliest date being June 25, the other known dates in July, September and October.

4. *Anthidium atriventre* Cresson

Females: Meadow Valley, Plumas Co., Calif., 6000-7000 ft., June 17 (Van Dyke); Sparta, Baker Co., Oregon, July 2 (Van Dyke). Cresson described it from California (Hy. Edwards).

5. *Anthidium titusi* Cockerell

Males: Kings River Cañon, Fresno Co., Calif., July 3 (Van Dyke); Huntington Lake, Fresno Co., Calif., 7000 ft., July 4 (Van Duzee). These specimens have the scutellum entirely black. The Kings River Cañon specimen has hair of head and thorax above pale fulvous. The reference of these California insects to *A. titusi* must be considered provisional, or at least

they may be racially distinct. However, the form and structure agree well.

6. *Anthidium blanditum* Cresson

Female: South Fork Kings River, Fresno Co., Calif., July 8 (Van Dyke). This is smaller than Cresson's type, and has two elongate black marks on clypeus, no spot beneath tubercles, abdominal bands on segments 2 to 4 narrowly interrupted, and the femora rather differently marked. I assume that it represents only a variation, but more material is desirable. It is readily known from *angelicum* by the angulation at sides of last segment. The abdominal bands are broad and deep yellow.

7. *Anthidium fresnoense* Cockerell, new species

Female: Length about 8.5 mm.; robust, black, head and thorax with white hair, pure white on thorax above; eyes bluish green, black at lower end; head entirely black, including mandibles, except a round yellow spot above each eye; mesothorax very densely punctured; large mark on tegulae in front, very small one behind, end of the obtuse tubercles, and elongate marks on axillae and scutellum, yellow; scutellum depressed in middle posteriorly; legs black, the tibiae with yellow stripes, not reaching the apex; hair on inner side of hind basitarsi black; wings dusky, second cubital cell long; abdomen with five lemon-yellow bands, and on first segment four marks, the outer ones large and quadrate, the inner consisting of transverse stripes; bands on segments 2 to 6 all narrowly interrupted and emarginate at sides anteriorly; ventral scopa dark gray-brown, white anteriorly and at sides.

Differs from *A. palliventre* Cress. by the scutellum, axillae and tibiae being conspicuously marked with yellow. The lemon-yellow abdominal bands at once separate it from *A. tenuiflorae* Ckll.

Type: Female, No. 1729, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 12, 1919, at Huntington Lake, Fresno Co., California, at 7000 ft. elevation.

8. *Anthidium xanthognathum* Cockerell, new species

Female: Length 7-8 mm.; compact, black with rather pale, dull yellow markings; hair of head and thorax dull white, varying to fulvous above;

eyes pea-green, black at lower end; face all black but mandibles yellow, more or less stained with red; a pale yellow spot above each eye, mesothorax shining between punctures; tegulæ broadly in front, end of the obtuse tubercles and two transverse marks on scutellum, pale yellow; the axillæ may also be marked with yellow; wings somewhat dusky; small joints of tarsi ferruginous; all the tibiæ with a yellow mark at base, or front pair with a stripe nearly to apex; hair on inner side of hind basitarsi pale ferruginous; abdomen with four marks on first segment, the lateral ones large and quadrate; segments two to six with narrowly interrupted bands, on 2 and 3 broadly emarginate at sides in front; on sixth segment the band is reduced to a pair of large transverse subpyriform spots; ventral scopa entirely white.

Type: Female, No. 1730, Mus. Calif. Acad. Sci., collected by Dr. F. E. Blaisdell, September 6, 1896, at **Mokelumne Hill, California**. Variant form from Soboba Springs, California, June 5, 1917 (Van Duzee). The alternative statements in the description refer to the latter. Resembles *fresnoense*, but smaller, with yellow mandibles.

9. *Anthidium fontis* Cockerell, new species

Male (*type*): Length about 9 mm.; black with yellow markings, pale on face, but deep lemon-yellow on abdomen; head and thorax with abundant long hair, fulvous dorsally, otherwise whitish; eyes entirely pea-green; antennæ black, flagellum very obscurely brown beneath; mandibles, except apex, clypeus, lateral face marks (truncate above at about level of antennæ) and dots above eyes, all yellow; mesothorax very densely punctured; tegulæ broadly in front and spot behind, tubercles, two lines on scutellum, stripes from end to end of anterior and middle tibiæ, and apical and basal spots on hind tibiæ, all yellow; basitarsi pale yellow, small joints red; wings dusky; first abdominal segment with large lateral and pyriform median spots; segments 2 to 6 with narrowly interrupted bands, more or less emarginate anteriorly at sides; seventh segment entirely dark red, with very broad short lobes, much broader than distance between either and the median spine; last ventral segment with a deep median sulcus.

Female: Length about 8-8.5 mm., with bright lemon-yellow markings; eyes bluish green, black below; greater part of mandibles, clypeus except two coalescent black triangles above, lateral face marks, broadly truncate below level of antennæ, and large triangular spots above eyes, all yellow; the yellow on thorax and legs includes bent stripe along each side of mesothorax, broad marks on axillæ and scutellum, marks on tegulæ anteriorly and posteriorly, tubercles, stripes on apical part of anterior and middle femora beneath, spot on hind femora, broad bands on outer side

of all tibiae and large marks on hind basitarsi; first abdominal segment with four spots, the inner one transverse but not linear; segments 2 to 6 with broad bands, the first two slightly interrupted, the others notched, the first deeply, the second shallowly emarginate at sides, the last with a double emargination (two notches) at each side in front; ventral scopa entirely pale.

Type: Male, No. 1731, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, between May 31 and June 3, 1917, at **Soboba Springs, Riverside Co., California**. *Paratypes*: Four males and one female, same data; one female Bryson, Monterey Co., Calif., May 18, 1920 (Van Duzee). Allied to *A. angclarum* Titus, but certainly distinct, especially by the terminal segment of the male abdomen.

10. *Anthidium permaculatum* Cockerell, new species

Female: Length 10-10.5 mm.; robust, black, with very pale yellow markings; hair of head and thorax dorsally fulvous, otherwise white; clypeus broadly black in middle, with an elongate pale mark on each side; lower edge of clypeus bidentate at each side; lateral face marks large, obliquely truncate above; mandibles with a large yellow mark; a cuneiform yellow mark above each eye; yellow of thorax and legs consisting of large spot on front and small behind on tegulae, stripes along edge of mesothorax above, tubercles, marks on axillae and scutellum, stripes on under side of anterior and middle and spot on hind femora, outer face of tibiae, and mark on hind basitarsi; small joints of tarsi ferruginous; hair on inner side of hind basitarsi reddish brown; wings dusky; first abdominal segment with four marks, the inner ones larger and subtriangular; segments 2 to 6 with broad bands, on 2 interrupted in middle and deeply notched at sides, the median parts broad claviform, on 3 narrowly interrupted in middle and deeply notched at sides in front, on 4 and 5 deeply notched in middle and shallowly emarginate at sides; sixth segment strongly angulate at sides posteriorly, nearly all pale, the light color doubly emarginate at each side in front; ventral scopa pure white.

Type: Female, No. 1732, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, July 2, 1922, at **Sparta, Baker Co., Oregon**. *Paratype*: Baker, Oregon, June 3, 1922 (Van Dyke). Known from *A. hesperium* Swenk by the very pale abdominal bands and the sixth segment strongly dentiform at sides. The last character and the face marks separate it from *A. emarginatum* Say, which it superficially resembles.

11. *Anthidium divisum* Cockerell, new species

Female: Length about 7.5 mm.; compact, black, with cream-colored markings; hair of head and thorax reddish above, otherwise white; eyes sea-green, black at lower end; base of mandibles, large patch at each side of clypeus, not reaching upper end, lateral face marks adjacent to sides of clypeus and not quite reaching orbits, and spot above eyes, yellowish white; mesothorax very densely punctured; anterior and posterior spots on tegulae, hardly visible stripe above, well developed marks on axillae and scutellum, tubercles, and stripes on all the tibiae, not reaching apex, cream-color; hair on inner side of basitarsi light ferruginous; wings somewhat dusky; abdomen with four spots on first segment, the outline of the discal ones straight behind and strongly convex in front; segment 2 to 6 with narrowly interrupted bands, that on 5 not quite interrupted, band on 2 deeply notched anteriorly at sides; ventral scopa pure white.

Type: Female, No. 1733, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 24, 1922, in **Parley Cañon, Salt Lake City, Utah**. *Paratype*: Cayton, Shasta Co., California, July 13, 1918 (Van Duzee). Variety with clypeal markings reduced to a small round spot on each side, lateral marks to small nearly divided marks next to clypeal margin and stripe on anterior tibiae divided into two, from Pine View, Utah, July 21, 1922 (Van Duzee). Allied to *permaculatum* but considerably smaller and the lateral face marks not larger than the clypeal marks.

12. *Anthidium divisum ornatifrons* Cockerell, new variety

Female: Clypeal patches larger, approaching in middle line, and between them, with its base touching them, a small yellowish triangular mark, its apex directed upward.

Type: Female, No. 1734, Mus. Calif. Acad. Sci., collected by E. C. Van Dyke, June 15, 1924, at **Meadow Valley, Plumas Co., California**, at 3500-4000 ft. The face marks rather suggest *A. sagittipictum* Swenk.

13. *Anthidium divisum nanulum* Cockerell, new variety

Female: Very small, length about 5.3 mm.; markings distinctly yellower than in the other two forms; clypeus very pale yellowish, with a pair of black triangles, contiguous at base, their apices pointing downward, on upper part, and also a very small black spot next to the lower

margin in middle; lateral marks filling space between clypeus and eye, and broadly truncate a short distance above level of top of clypeus; spots above eyes pyriform.

Type: Female, No. 1735, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 20, 1920, at Bryson, Monterey Co., California. Perhaps a distinct species.

The following key will facilitate the separation of the females described above:

- Face entirely black 1
- Face not all black..... 2
- 1. Larger; mandibles black..... *fresnoense* Ckll.
- Smaller; mandibles yellow..... *xanthognathum* Ckll.
- 2. Middle of clypeus black from base to apex..... 3
- Middle of clypeus not black to apex..... 5
- 3. Abdominal bands deep yellow..... *hesperium* Swenk
- Abdominal bands pale..... 4
- 4. Larger; lateral face marks much larger than clypeal marks.....
- *permaculatum* Ckll.
- Smaller; lateral marks not larger than clypeal marks.. *divisum* Ckll.
- 5. Abdominal bands and clypeal marks cream-color..... 6
- Abdominal bands yellow or orange..... 7
- 6. Larger; area between clypeus and eye not all light.....
- *divisum ornatifrons* Ckll.
- Smaller; area between clypeus and eye all light.....
- *divisum nanulum* Ckll.
- 7. Upper edge of clypeal yellow W-like..... *fontis* Ckll.
- Not so; clypeus with spots or stripes..... 8
- 8. Larger; (for other characters see description).....
- *pecosense fragariellum* Ckll.
- Smaller 9
- 9. Last segment yellow, strongly angulate at sides... *blanditum* Cress
- Last segment not angulate at sides..... *angelarum* Titus

14. *Anthidium mormonum* Cresson, and allies

In 1878 Cresson described this species from a single male obtained by Ulke in Utah. In 1879 he described *A. blanditum*, based on a couple of females collected by Morrison in Nevada. In 1904 I described *A. pecosense* and *A. bernardinum*, the latter with three varieties. In 1911 I remarked, "The female of *A. pecosense* so nearly agrees with the description of *A. blanditum* from Nevada as to suggest that the two represent varia-

tions or races of one species." Swenk in 1914 made the combination *A. blanditum pecosense* (Ckll.). Certainly we have here a group of very closely allied forms, difficult to classify correctly. The relatively large *A. bernardinum*, with rich orange markings, the apical lobes of the male abdomen very broad, the axillæ orange, and other good characters, may be set aside as distinct. *A. aridum* (*A. bernardinum aridum* Ckll.) is certainly distinct from the others by the pointed apical lobes of the abdomen, scape yellow in front, entirely black axillæ, etc.

Three males from Beaver Creek, Kamas, Utah, July 4, 1922 (Van Duzee), must be referred to *A. pecosense*, though the apical lobes of abdomen are variable, in one specimen spreading instead of parallel. The hair of thorax above is fulvous; the axillæ have small yellow spots; the yellow of anterior tibiæ is continuous. These differ from *A. mormonum* by the fulvous dorsal pubescence, the large discal spots on first abdominal segment and the more spreading apical lobes of abdomen, with broader and shallower sinus between lobes and median spine. It is thus unsafe to assert that *mormonum* and *pecosense* are one species, though it may be that they will prove inseparable, or only racially distinct.

The males described from California as varieties *fragariellum* and *wilsoni* of *A. bernardinum* belong rather to the *mormonum-pecosense-blanditum* alliance, as shown by the apical lobes of abdomen and the merely spotted axillæ. They evidently represent a single species, but the dorsal hair of thorax is white in *fragariellum*, yellow-fulvous in *wilsoni*. The *wilsoni* form is represented by three males from Meadow Valley, Plumas County, California, 4000 ft., June 8 and 15 (Van Dyke), except that these have the yellow on anterior tibiæ interrupted, whereas in typical *wilsoni* it is continuous. The *fragariellum* form is represented by males from Meadow Valley, 3500-4000 ft., June 21 (Van Dyke); South Fork Kings River, Calif., July 8 (Van Dyke), and Fallen Leaf Lake, Calif., July (L. S. Rosenbaum). The last has the yellow on anterior tibiæ interrupted, but it is entire on the other two, and also in typical *fragariellum*.

These California males run smaller than *A. pecosense* and have more yellow on apical segment of abdomen. In the type

of *fragariellum*, but not in the others, the yellow on first segment of abdomen consists of a pair of large cuneiform patches, deeply incised posteriorly. This also has large yellow patches on anterior and middle femora, but the series shows that these vary. I conclude that the Californian insect is a valid subspecies of *A. pecosense*. The name *fragariellum* is to be preferred over *wilsoni*, having priority where it is first printed, in the table published May, 1904.

Coming now to the females, we fortunately have a couple from Meadow Valley, 3500 to 4000 ft., June 8 and 21 (Van Dyke), certainly belonging with the males just recorded. The one of earlier date has hair of head and thorax above deep fulvous; in the other it is much paler but not white. In both the clypeus is entirely yellow. This insect agrees with the description of *A. blanditum* except for the fact that there is a large oblong yellow patch on mesopleura, and perhaps also in the more fulvous dorsal pubescence. The patch on pleura seems to be of little importance because a female of the same species from Fallen Leaf Lake, California, June 26 (Van Dyke), has the mesopleura entirely black. The same is true of one from Guerneville, Sonoma Co., Calif., May 30 (Van Dyke). These with black pleura have the hair of head and thorax above strongly fulvous. The female of *A. pecosense*, as identified by me from Flagstaff, Arizona, differs from the above Californian females in being larger, in having the mesopleura black, and yellow only bordering the tubercles; the dorsal hair is red. A female from Strawberry Valley, California (Davidson), which I ascribed to *A. bernardinum*, is small and agrees in all essential particulars with the one from Fallen Leaf Lake. It is better referred to *A. fragariellum*. Thus the whole series discussed will stand for the present thus:

- A. bernardinum* Ckll.
- A. aridum* (Ckll.)
- A. mormonum* Cresson
- A. blanditum* Cresson (?? of *mormonum*.)
- A. pecosense* Ckll. (? var. of *mormonum*+*blanditum*.)
- A. pecosense fragariellum* (Ckll.) (?=*blanditum*.)
- A. pecosense fragariellum* var. *wilsoni* (Ckll.) (apparently not a valid race).

The question marks can only be removed by further investigation.

15. *Anthidium tricuspidum* Provancher

California: Mokelumne Hill, June (Blaisdell); Crystal Lakes, San Mateo County, June 25 (Van Duzee); Cazadero, September 2 (Van Duzee). San Diego, Calif. (Blaisdell), male. Oregon: Crater Lake, 7000 ft., July 16 (Van Dyke).

16. *Anthidium bernardinum* Cockerell

California: Mill Creek Cañon, San Bernardino Co., September 21 (Van Duzee). The males are variable; hair on thorax above white or fulvous; scape practically all black or with a large yellow mark.

17. *Anthidium emarginatum atripes* Cresson

The following females differ from typical *A. emarginatum* in having the tibiæ entirely black. I can refer them only to Cresson's *atripes*, based on a male from Nevada.

California: Huntington Lake, Fresno Co., 7000 ft., July 4 and 27 (Van Duzee); Meadow Valley, Plumas Co., 3500 ft., June 21 (Van Dyke); Blue Lakes, Alpine Co., July and August (Blaisdell).

These females are distinguished among those with creamy-white markings by the white ventral scopa, face entirely black and scutellum and axillæ having prominent light markings. It is, however, a source of perplexity that I do not find a corresponding series of males. The possible males have the scutellum and axillæ entirely black, or at least with very small light spots, and certainly do not represent any form of *A. emarginatum*. These females appear to agree with *A. emarginatum* except for the black tibiæ. Only field observations will determine the actual facts.

18. *Anthidium maculosum* Cresson

Females from Yosemite Valley, Calif., June 21 (Van Dyke); Sisson, Calif., July 24 (Van Duzee), and Mokelumne Hill, Calif. (Blaisdell). Males from Anacapa Island, May 15 (Van Duzee), Huntington Lake, 7000 ft., July 27 (Van Duzee), Mill Creek Cañon, San Bernardino Co., Sept. 21 (Van Duzee), all in California, and Hereford, Arizona, July 12 (J. R. Slevin). Cresson in 1878 described *A. maculosum* from females collected in Utah and California; in 1916 he designated Utah as the type locality. In 1904 I described *A. lupinellum* from the male collected in New Mexico, and in 1923 recorded this species from the Gulf of California region. The six California and Arizona males before me are considerably larger than the type of *lupinellum*, but otherwise identical. I have now no doubt that *lupinellum* is the male of *maculosum*, and the species is to be known by the latter name.

19. *Anthidium palliventre* Cresson

This was based on a female collected in California by Hy. Edwards, characterized by the entirely black face, scutellum and axillæ, hair of the head and thorax above yellowish, ventral scopa entirely pale. The same collector obtained *A. californicum*, described from males. After a good deal of perplexity I am now compelled to conclude that they are sexes of one species, which takes the prior name *A. palliventre*. However, the color of the scopa varies from white to nearly all black, only the sides remaining white. I am convinced that this is not a specific character. Such variation has been recorded before, as in *A. astragali* Swenk. The females assigned to *palliventre* come from San Francisco, Calif., April (Van Dyke) and May (Kusche); Colma, Calif., August 15 (Kusche), and San Miguel Island, Calif., May 20 (Van Duzee). The last mentioned is unusually large with corners of sixth abdominal segment prominent. These all differ from the female of *A. tenuifloræ* Ckll. in having abdominal bands more or less interrupted in middle and the divisions claviform mesad. The male (*A. californicum* Cress.) comes from Colma, Calif.,

Aug. 15 (J. A. Kusche), and San Francisco, May 10, 21 and 30 (Kusche), and April 20 (Van Dyke). The dorsal hair of head and thorax is ferruginous, whereas in males from Los Angeles (Davidson) it is white, as I recorded in 1904.

20. *Anthidium plumarium* Cockerell, new species

Male: Aspect of *A. californicum*, including the red dorsal pubescence. At first I thought it a mere variety or race, but it is surely a distinct species by the following characters: Lateral apical lobes of abdomen stout but pointed (broadly rounded in *californicum*); mandibles broader; mouth parts ferruginous; upper edge of clypeus black with two pointed extensions downward; sixth abdominal segment with only two small yellow spots.

Evidently derived from *A. californicum* (*palliventre*).

Type: Male, No. 1736, Mus. Calif. Acad. Sci., collected by Dr. E. C. Van Dyke, June 5, 1924, at **Meadow Valley, Plumas Co., California.**

21. *Anthidium tenuifloræ* Cockerell

This Rocky Mountain species proves to extend into the Pacific coast region. The females are very like those of *A. palliventre*, but may be separated by the abdominal bands being very narrowly interrupted, the divisions not claviform but strap-shaped. The eyes are also darker. The ventral scopa is usually mainly or almost wholly black, but it varies to all light in Huntington Lake specimens. Females are from Huntington Lake, Calif., 7000 ft., July 4 (Van Duzee); Steen Mountains, Oregon, June 25 (Van Dyke), and Longmire, Rainier National Park, Wash., July 27 (Van Dyke). The last mentioned has the bands unusually slender. Males are from Longmire (same date as females) and Crater Lake, Oregon, 7000 ft., July 17 (Van Dyke).

22. *Anthidium banningense* Cockerell

The following references are to males; the basitarsi are cream colored in front and the anterior and middle tibiæ have a spot.

California: Meadow Valley, Plumas Co., 3500-4000 ft., June 21 (Van Dyke); Huntington Lake, Fresno Co., July 4 (Van Duzee); Blue Lakes, Alpine Co., August (Blaisdell). Utah: Logan, July 14 (Van Duzee); lateral apical spines of abdomen broader; sixth and seventh segments entirely black. Apparently not a race, as one of the Meadow Valley specimens is the same.

Readily known from male *A. emarginatum* by the long narrow lateral apical lobes of abdomen and the tegument of scutellum wholly black.

23. *Anthidium angulatum* Cockerell, new species

Male: Similar to *E. emarginatum* Say, but rather less robust; abdominal bands conspicuously paler (creamy white), and reduced to fine lines at the broad emarginations; hair of thorax above white; scutellum entirely black or with a pair of minute pale marks. Apical lobes of abdomen angulate as in *A. emarginatum*. Differs from *A. emarginatum atripes* Cresson by the broad band on fifth abdominal segment and pair of large comma-like marks on sixth, small pale marks on bases of tibiae, and creamy white basitarsi. The clypeus may have or lack two small black spots. Perhaps to be regarded as a Californian race of *A. emarginatum*.

Type: Male, No. 1737, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 7, 1919, at Huntington Lake, Fresno Co., California, at 7000 ft. *Paratype*, one male, taken by Dr. E. C. Van Dyke, July 11, 1915, at Fallen Leaf Lake, California.

24. *Anthidium brachyurum* Cockerell, new species

Male: Length about 10 mm.; black, the head and thorax with white hair, very faintly tinged with yellowish dorsally; flagellum obscurely reddish beneath except basally; light markings cream-color, the light parts being entire clypeus, lateral marks, truncate at about level of antennae, mandibles except apically (red just before the black apex), small spots above eyes, tegulae in front and small mark behind, small marks at bases of tibiae, elongate mark near end of front tibiae, subquadrate mark at apex of mid tibiae, the basitarsi, large lateral and small dorsal marks on first abdominal segment, second segment similar but with larger dorsal marks, segments 3 to 5 with narrowly interrupted bands, deeply emarginate laterally, sixth with very large hook-like marks; seventh segment

entirely black with very broad low lateral lobes narrowly separated from the central spine; tubercles, mesothorax, axillæ and scutellum entirely black; eyes pea-green; mesothorax extremely densely punctured; wings dusky; hair on inner side of hind tibiæ white.

With the type I associate two other specimens differing in some respects:

Salt Lake City, Utah, June 27, 1922 (Van Duzee); hair of head and thorax above abundant, light fulvous; apical lobes separated from spine by a deeper, rounded, emargination, but hardly half breadth of lobe; sixth segment with two large pyriform marks.

Redding, California, July 7, 1918 (Van Duzee); subapical marks on anterior tibiæ very minute; marks on sixth segment smaller; emargination between lobes and spine rather shallow and not abrupt. I think these are all one species, however. It is known from the related species by the broad low apical lobes of abdomen. Its nearest relative appears to be *A. montivagum* Cresson.

Type: Male, No. 1738, Mus. Calif. Acad. Sci., collected by Mrs. H. E. Ricksecker, in July, 1920, at **Cisco, California**.

25. *Anthidium hamatum* Cockerell, new species

Male: Length about or nearly 13 mm.; black, the head and thorax with abundant white hair, grayish dorsally; light markings cream-color, consisting of entire clypeus, lateral marks (filling space between clypeus and eyes and obliquely truncate above, the inner corner meeting upper corner of clypeus), mandibles except apex, spot at end of scape, small spot above eyes, tegulæ anteriorly and small spot behind, tubercles (which are obtuse), two very small lines on hind border of scutellum, marks at bases of tibiæ, spot at apex of middle tibiæ, basitarsi, large lateral and narrow transverse dorsal marks on first abdominal segment, bands on segments 2 to 5 (narrowly interrupted in middle and very widely emarginate at sides) and a pair of hook-like marks on sixth segment; apical segment and mesothorax entirely black; eyes gray; mesothorax extremely densely punctured; wings dusky; apical lobes of abdomen wide apart, obtuse, the outer side strongly concave, distance between lobes and spine much greater than width of lobes. The lobes resemble in form those of *A. mormonum* Cress. but are much wider apart.

Type: Male, No. 1739, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 8, 1922, on **Mt. Timpanogos, Utah**.

26. *Anthidium spinosum* Cockerell, new species

Male: Length about or slightly over 11 mm.; black, the head and thorax with abundant white hair, inclined to grayish dorsally; light markings cream-color, consisting of clypeus (except a pair of black lines on upper part), lateral marks (filling space between clypeus and eye, with upper end rounded), greater part of mandibles, spots above eyes, mark on tegulæ in front, two very small spots on scutellum (or none), basitarsi (but tibiæ all black), four spots on first abdominal segment (the lower smaller but not linear), bands on segments 2 to 5 (very narrowly or not quite interrupted in middle, very broadly emarginate at sides, the inner portion thick), and a pair of comma-like marks on sixth segment; eyes greenish gray; scutellum shining on disc; wings dusky; hair on inner side of hind basitarsi dark brown; tubercles entirely black, produced and spini-form; apical lobes of abdomen of the same type as those of *A. hamatum*.

Type: Male, No. 1740, Mus. Calif. Acad. Sci., collected by Dr. E. C. Van Dyke, July 11, 1915, at **Fallen Leaf Lake, California**. *Paratype*, one male, same data. I had taken this for a form of *A. hamatum* until I noticed the entirely different spini-form tubercles.

The new species described above and a related form may be separated as follows, all being males with the abdominal bands whitish or very pale:

- Apical lobes finger-like; clypeus with two black spots.....
.....*banningense* Ckll.
- Apical lobes angular.....*angulatum* Ckll.
- Apical lobes broad and rounded..... 1
- 1. Apical lobes twice as broad as space between them and median spine
.....*brachyurum* Ckll.
- Apical lobes not thus broadened..... 2
- 2. Tubercles creamy white, obtuse seen from above....*hamatum* Ckll.
- Tubercles black, sharply pointed seen from above....*spinosum* Ckll.

27. *Anthidium flavicaudum* Cockerell, new species

Male: Length about or nearly 11 mm.; black with yellow markings (reddened by cyanide in type); head and thorax with white hair; eyes brown; flagellum obscurely reddish beneath; mesothorax extremely densely punctured; tubercles not spiniform; wings dusky; apical lobes of abdomen rounded, wide apart, apically much narrower than the distance between them and spine; spines at sides of sixth segment short and pale; yellow markings as follows: entire clypeus, lateral marks (ending above on orbit at level of antennæ, but the inner corner at top of clypeus, the oblique upper side curved); mandibles (except apex nar-

rowly), subpyriform spots above eyes, spot on front of tegulæ, tubercles, elongate marks on scutellum, shorter ones on axillæ, stripes on anterior and middle femora beneath, elongate mark on hind femora apically, entire outer face of tibiæ, basitarsi (small joints of tarsi clear ferruginous), broad bands on abdominal segments 1 to 6, on 1 broadly interrupted in middle and deeply emarginate or excavated posteriorly at sides, on 2 and 3 rather narrowly interrupted in middle and deeply but not widely excavated anteriorly at sides, on 4 very narrowly interrupted in middle and much more shallowly excavated anteriorly at sides, on 5 deeply notched in middle and merely undulate at sides, sixth yellow except black hind margin, seventh yellow with spine and broad apices of lobes black; venter with much white hair.

Differs from *A. pecosense wilsoni* (Ckll.) by the entirely black mesothorax and much shorter spines at sides of sixth segment (in *wilsoni* they are long and dark); they are however, closely allied. In *wilsoni* the tegulæ have the whole outer margin yellow.

Type: Male, No. 1741, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 26, 1918, at **Sisson, California.**

28. *Anthidium puncticaudum* Cockerell, new species

Male: Length about 11 mm.; black with lemon-yellow markings; hair of head and thorax white; eyes pea-green; mesothorax dull and granular; scutellum dull, with a little shining area on disc posteriorly; wings dusky; tubercles black, sharply pointed but not spiniform; spines at sides of sixth abdominal segment long and black; lobes of terminal segment broad and rounded, produced, the ends separated by more than their width from the spines; lemon-yellow markings as follows, entire clypeus, lateral marks (filling space between clypeus and eye and obliquely truncate above), mandibles except tips, spot above eyes, mark on tegulæ in front and small one behind, stripes on all the tibiæ (on middle ones interrupted), basitarsi (small joints ferruginous), four spots on first and also on second abdominal segments, the dorsal spots on first small, but on second large and similar to the corresponding parts on third, where, as also on fourth, they are connected by a slender line with the lateral spots, fifth segment with a narrowly interrupted band, widely excavated anteriorly on each side, similar to that on fourth, sixth with two large suboval marks, notched on outer side, apical segment with two small yellow spots.

Among the species with entirely black thorax this is known by the deeply incised or divided lateral portions of abdominal bands, the entirely black scutellum, seventh segment with only

two small yellow spots, clypeus all yellow and apical lobes of abdomen elongate though broadly rounded.

Type: Male, No. 1742, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, May 26-28, 1917, at **Colton, California.**

29. *Anthidium lucidum* Cockerell, new species

Male: Length about 10 mm.; black, with lemon-yellow markings; hair of head and thorax white. Resembles *A. puncticaudum*, but smaller and more slender, with apical lobes of abdomen narrower, obtusely pointed, abdomen more shining, upper part of clypeus with two large hook-shaped black marks, lateral face marks going very little above level of top of clypeus, tubercles tipped with yellow, scutellum with two very small yellow marks, bands on tibiae reduced and broken, first abdominal segment with only lateral spots, and these not very large, second segment with band like that on third, sixth with two hook-shaped marks, seventh all black. This is closer to *A. titusi* Ckll., differing by the entirely black scape, clypeal marks much deeper yellow, face marks lemon-yellow, abdominal bands, etc.

The California form which I have regarded as *A. titusi* has the scape black and the abdominal bands strongly yellow. It is between the two and perhaps better associated with *A. lucidum*, but additional observations are desirable. *A. angulatum* Ckll. is also related but clearly distinct.

Type: Male, No. 1743, Mus. Calif. Acad. Sci., collected by F. C. Clark, July 20, 1919, at **Huntington Lake, Fresno Co., California**, at 7000 feet.

Anthidiellum Cockerell

Dianthidium subg. *Anthidiellum* Ckll., Bull. So. Calif. Acad. Sci., III, p. 3 (1904). Type *strigatum* Panzer.

Anthidium subg. *Cerianthidium* Friese, Europ. Bienen, Lief. 3, p. 304 (1923). For *strigatum* Panz. and *inermis* Fr. Type, now designated, *strigatum* Panzer.

This widespread and well characterized group may well stand as a genus. It includes such species as the following, described under *Anthidium* or *Dianthidium*: *Anthidiellum strigatum* (Panzer), Europe; *A. strigatum luteum* (Friese), Greece; *A. leucorhinum* (Ckll.), Siberia; *A. truncatiforme*

(Ckll.), Gold Coast; *A. tegwaniense* (Ckll.), S. Africa; *A. compactum* (Smith), S. Africa; *A. cucullatum* (Friese), Africa; *A. ciseni* (Ckll.), Lower California; *A. perplexum* (Smith), Georgia; *A. ehrhorni* (Ckll.), California; *A. robertsoni* (Ckll.), California; *A. gilense* (Ckll.), New Mexico.

30. *Anthidiellum robertsoni* (Cockerell)

Females: Kings River Cañon, Fresno Co., Calif., 5000 ft., May 25, and July 2 (Van Dyke); Mokelumne Hill, Calif. (Blaisdell); Colestin, Jackson Co., Oregon, July 30 (Van Duzee); Salt Lake City, Utah, July 1 (Van Duzee).

Males: Mokelumne Hill, Calif. (Blaisdell); Mill Creek Cañon, San Bernardino Co., Calif., Sept. 21 (Van Duzee). This species was discovered by Dr. Davidson at Rock Creek and Los Angeles, Calif.; it is surprising to find it extending its range to Oregon and Utah and well up into the mountains.

31. *Anthidiellum robertsoni citrinellum* Cockerell, new race

Male: Face marks bright lemon-yellow; a short yellow line on thorax behind each tegula; abdominal bands deep chrome yellow.

Type: Male, No. 1744, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 17, 1919, at **Huntington Lake, Fresno Co., California**, at 7000 ft.

32. *Dianthidium sayi* Cockerell

Females: Salt Lake City, Utah, July 1, 1922 (Van Duzee).

33. *Dianthidium provancheri* Titus

Females: Cascada, Fresno Co., Calif., July 29, 1919, 6000 ft. (Van Duzee).

34. *Dianthidium singulare* (Cresson)

California: Meadow Valley, Plumas Co., 3000-4000 ft., June 13, one male (Van Dyke).

35. *Dianthidium singulare perluteum* T. & W. Cockerell

California: South Fork Kings River Cañon, Fresno Co., 5000 ft., July 5, 2 females, 2 males (Van Dyke). Described in 1904 from the female. The male has the end of the abdomen broadly trilobed, the seventh segment yellow without markings, the lateral lobes rounded, the middle one obtusely pointed and ferruginous at end.

36. *Dianthidium singulare melanognathum* Cockerell,
new subspecies

Female: Marked like typical *D. singulare* from Nevada but mandibles black with a yellow spot at base; wings dusky; black mark on clypeus fusiform; coxal spines very long.

Type: Female, No. 1745, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, July 7, 1919, at **Huntington Lake, Fresno Co., California**, at 7000 ft.

37. *Dianthidium pudicum* Cresson

Females: Longmire, Rainier National Park, July 27 (Van Dyke); Huntington Lake, Fresno Co., Calif., 7000 ft., July 4, 1919 (Van Duzee); Strawberry Valley, Eldorado Co., Calif., August 14 (Van Dyke). The clypeus may be entirely black or may have a small light spot at each extreme side.

Males: Fallen Leaf Lake, Calif., July 17 (Van Dyke); Salt Lake City, Utah, June 27 (Van Duzee).

38. *Dianthidium consimile* (Ashmead)

Females: Ashland, Oregon, Aug. 2 (Van Duzee); Coleslin, Oregon, July 30 (Van Duzee); also the following places in California: Cascada, 6000 ft., July 29 (Van Duzee); Bear Valley, San Bernardino Mts., Aug. (F. C. Clark); Cayton, Shasta Co., July 13 (Van Duzee); Mokelumne Hill, June (Blaisdell); Mill Creek Cañon, San Bernardino Mts., Sept. 21 (Van Duzee).

Males, all from California, as follows: Mokelumne Hill, June and Sept. (Blaisdell); Cascada, Fresno Co., July 29 (Van Duzee); Soboba Springs, Riverside Co., June 1 (Van Duzee); Mill Creek Cañon, San Bernardino Mts., Sept. 24 (Van Duzee); South Fork Kings River, July 8 (Van Dyke). The Kings River one lacks the yellow spot on mesopleura.

As in the allied *D. provancheri* the face markings are cream colored in the male, lemon-yellow in the female. The female clypeus has the middle broadly or narrowly black, there is a well developed triangular supra-clypeal mark and a bar-like yellow mark below the anterior ocellus. In the male the clypeus is all light, the supra-clypeal mark is a mere dot, and the mark before the ocellus is absent or represented by a very small line. The abdominal bands are broadly and deeply emarginate at sides posteriorly in the male but with much smaller emarginations or entire in the females. It seems difficult to associate as sexes insects so different, but I believe they certainly belong together.

Ashmead (1896) described what he called the female, but part of the description refers to the male, part to the female. In 1904 I reported what I took for *D. consimile*, but it was really *D. provancheri* Titus. In 1916 (Pomona Jl. Ent. and Zool., VIII, p. 63) I gave characters to separate the males of the two species.

39. *Dianthidium parvum* (Cresson)

Females: Logan, Utah, July 18 (Van Duzee). The clypeus has a cream-colored spot on each side; the scutellum is black with a pair of extremely small light marks.

Males: Logan, Utah, July 18 (Van Duzee); Ashland, Oregon, Aug. 2 (Van Duzee); and the following places in California: Cayton, Shasta Co., July 13 (Van Duzee); Strawberry Valley, El Dorado Co., Aug. 4 (Van Dyke); Huntington Lake, Fresno Co., 7000 ft., July 26 (Van Duzee); Bear Valley, San Bernardino Mts., Aug. (F. C. Clark); Mill Creek Cañon, San Bernardino Mts., Sept. 21 (Van Duzee).

40. *Dianthidium parvum baculifrons* Cockerell, new race

Female: Face marks light yellow including lower lateral corners of clypeus, so that the black part of the clypeus rapidly narrows apically; a short yellow bar below middle ocellus; entire margin of scutellum broadly, and axillæ, yellow; lateral emargination of abdominal segments short, deep and rounded; scopa shining white (distinctly yellow in *D. parvum*).

This is intermediate between *D. parvum* and *D. provancheri*, differing from the latter by the paler face markings, with more black on clypeus; hind tibiæ black with a large pale yellow patch at base above, and sixth abdominal segment entirely black. It should perhaps be considered a form of *D. provancheri*, or a distinct species. Titus described only the male of *D. provancheri*.

Type: Female, No. 1746, Mus. Calif. Acad. Sci., collected by E. P. Van Duzee, June 5, 1917, at Soboba Springs, Riverside Co., California.

***Callanthidium* Cockerell, new genus**

Outer recurrent nervure going beyond end of second cubital cell; no pulvillæ on feet. On account of these characters I thought to refer these bees to the neotropical genus *Hypanthidium*, in which certain African and Indian species have already been placed. These large North American forms are, however, strongly divergent, not only by their size, but especially in the armature at the apex of the abdomen. The sixth segment is deeply emarginate in the middle in the female and the apex of the male abdomen shows a median spine and large lateral lobes. There is some affinity with *Dianthidium*, to which genus I wrongly referred the type species in 1914. Type, *C. illustre* (*Anthidium illustre* Cresson).

41. *Callanthidium illustre* (Cresson)

California: Yosemite Valley, June 21 (Van Dyke); Soboba Springs, Riverside Co., June 2 (Van Duzee); Poway, San Diego Co., May 24 (Blaisdell); Meadow Valley, Plumas Co.,

3500-4000 ft., June 21 (Van Dyke); Bear Valley, San Bernardino Co., July 13 (F. C. Clark); Claremont (C. H. Muzzall); Colton, May 26 (Van Duzee); Cayton, Shasta Co., July 13 (Van Duzee).

The next species is closely allied but is readily separated by the black femora.

In 1904 I described a supposed species, *Anthidium serranum*, from Rock Creek, California. It was recognized as valid by Swenk in 1914, but I now consider it only a variation of *Callanthidium illustre*, to be called *C. illustre serranum*. It is not even certain that it is a valid race.

42. *Callanthidium conspicuum* (Cresson)

California: Fallen Leaf Lake, July 17 (Van Dyke). Oregon: Fremont National Forest, Klamath Co., 5000 ft., June 18 (Van Dyke).

I have an apparently authentic female of *Dianthidium balli* Titus, labelled "Blydenburgh." On comparison with *C. conspicuum* it proves to be identical.

43. *Callanthidium formosum* (Cresson)

Oregon: Crater Lake, 7000 ft., July 17 (Van Dyke).

Described (under *Anthidium*) from Colorado. There are no pulvillæ and the species is near to *C. conspicuum*, but easily separated by the end of the male abdomen, the emargination of which is broader than Cresson's figure shows. I had suggested that this might be the male of *Dianthidium cressonii* D. T., but that has pulvillæ, much darker wings, and the first recurrent nervure ending far from base of second cubital cell (practically at basal corner in *C. formosum*).

44. *Callanthidium formosum pratense* Cockerell, new species

Male: Yellow stripes on head above nearly meeting in middle line; yellow marks on mesothorax in front larger; tegulæ with very large yellow patch; scutellum with a pair of yellow stripes; first abdominal segment with the yellow marks produced in hook-like form; band on third

segment narrowly continuous in middle, and not notched behind; seventh segment yellow right across, and the median spine only about half as long as the distance between it and the lateral lobes. As in the typical form, the lateral lobes are pointed, with the extreme apical face straight or slightly concave.

Type: Male, No. 1747, Mus. Calif. Acad. Sci., collected by Dr. E. C. Van Dyke, June 17, 1924, at **Meadow Valley, Plumas Co., California**, between 6000 and 7000 feet.